DOCUMENT RESUME

ED 255 372 SE 045 466

AUTHOR Fisher, Darrell L.; Fraser, Barry J.
TITLE Using Short Forms of Several Classroom Environment Scales to Assess and Improve Classroom Psychosocial Environment.
PUB DATE 85
NOTE 54p.; Paper presented at the Annual Meeting of the National Association for Research in Science Teaching (58th, French Lick Springs, IN, April 15-18, 1985).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Classroom Environment; *Classroom Techniques; Elementary School Science; Elementary Secondary Education; *Measures (Individuals); *Science Education; *Science Instruction; Secondary School Science; Social Psychology; Student Attitudes; *Test Construction; Test Validity
IDENTIFIERS Science Education Research

ABSTRACT

Economical, short forms of three measures were developed to facilitate science teachers' use of classroom climate assessments. The Classroom Environment Scale (CES) is a 24-item measure requiring a true or false response for each item. The My Class Inventory (MCI) is a 25-item measure requiring a yes or no response for each item. The Individualized Classroom Environment Questionnaire (ICEQ) is a 25-item measure requiring a Likert-type response for each item. When each instrument was administered to a large sample of science classes, results supported each scale's internal consistency reliability, discriminant validity, and ability to differentiate between the perceptions of students in different classrooms. Case studies involving use of the CES in a ninth-grade class and the MCI with sixth-grade students are included. Steps followed in both studies included: assessment (actual and preferred forms were administered); feedback (teachers considered profiles of mean class scores and identified actual-preferred discrepancies); reflection/discussion (deciding which classroom dimensions to change); intervention (activities aimed at changing the dimensions); and reassessment (determining if changes had occurred). In the junior high study, improvements occurred for the two dimensions (and only the two dimensions) on which change had been attempted. The paper includes a 7-page reference list. The ICEQ, CES, and MCI short forms are appended. (Author/JN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
✓ This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

3683t

ED255372

USING SHORT FORMS OF SEVERAL CLASSROOM ENVIRONMENT SCALES TO ASSESS AND IMPROVE CLASSROOM PSYCHOSOCIAL ENVIRONMENT

DARRELL L. FISHER

Tasmanian College of Advanced Education
Launceston, Tasmania, Australia 7250

BARRY J. FRASER

Western Australian Institute of Technology
Bentley, Western Australia 6102

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Barry J. Fraser
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Paper Presented at Annual Meeting of National Association for Research on Science Teaching, French Lick Springs, Indiana, April 1985

ABSTRACT

Despite international interest in research in the area of classroom environment, very little attention has been given to exploring how science teachers might apply ideas from the field of classroom environment in guiding practical improvements in science classrooms. In order to facilitate science teachers' use of classroom climate assessments, we developed economical short forms of the Classroom Environment Scale (CES), Individualized Classroom Environment Questionnaire (ICEQ), and My Class Inventory (MCI) which contain only approximately 25 items each and which are amenable to easy hand scoring. When each instrument was administered to a large sample of science classes, results supported each scale's internal consistency reliability, discriminant validity, and ability to differentiate between the perceptions of students in different classrooms. The methods for improving classrooms are illustrated by reporting some case studies of change attempts. For example, when the CES was used in an attempt to improve the environment of a ninth grade science class, the steps followed were (1) assessment (the actual and preferred forms were administered), (2) feedback (the teacher considered profiles of mean class scores and identified actual-preferred discrepancies), (3) reflection and discussion (leading to a decision that the teacher would attempt to change two dimensions), (4) intervention (aimed at increasing these two aspects), and (5) reassessment (in order to detect any changes in classroom environment). The interesting finding was that significant improvements occurred for the two dimensions, and only the two dimensions, on which change had been attempted.

Recent books and comprehensive literature reviews (Walberg, 1976, 1979; Moos, 1979; Fraser, 1981a,b, 1985a; Fraser and Walberg, 1981; Chavez, 1984) clearly illustrate that classroom environment has been an active area of investigation among science education researchers over the past 15 years. But relatively little work has been directed toward helping science teachers assess and improve the environments of their own classrooms. Practical constraints inhibiting science teachers' use of classroom environment instruments include difficult access to instruments, the fact that many existing instruments lack economy in terms of testing and scoring time, and the unavailability of case studies of successful attempts at improving science classroom environments. Consequently, to fill this gap, this paper describes several highly economical instruments for assessing students' perceptions of psychosocial characteristics of their classroom learning environment and reports some case studies of successful recent uses of classroom environment scales to provide information in guiding improvements in classrooms.

A major contribution of this paper is that it makes some economical new short forms of three widely applicable classroom environment instruments readily accessible to science teachers. This is achieved by describing the background and development of the instruments, including each instrument in an appendix, describing straightforward hand scoring procedures, and reporting comprehensive validation data to enhance teachers' confidence in using the scales.

The paper focuses on an approach in which feedback information based on student perceptions is employed as a basis for reflection upon, discussion of, and systematic attempts to improve classroom environments. The basic logic underlying the approach has been described for school classrooms by Fraser

(1981c, 1985b) and involves, first, using assessments of student perceptions of both their actual and preferred classroom environment to identify discrepancies between the actual classroom environment and that preferred by students and, second, implementing strategies aimed at reducing existing discrepancies. This method can be justified partly in terms of some recent person-environment fit research (Fraser and Fisher, 1983a, b) which suggests that students achieve better when in their preferred classroom environment.

Discussion is divided into three main sections. First, relevant literature related to the task of improving classroom environments is briefly reviewed. Second, a description is provided of the development and validation of short forms of three widely applicable instruments for assessing classroom psychosocial environment. Third, a report is given of two case studies involving the use of the short forms of the classroom environment scales in attempts to improve science classrooms.

RELATED LITERATURE

Although very little literature deals directly with the use of student environment perceptions in facilitating changes in classroom environments, there exists some interesting literature related indirectly to this task. For example, as part of the teacher-as-researcher movement in Britain, curriculum workers such as Stenhouse (1975) and Elliott (1976-77) have advocated a mode of action research in which teachers deliberately and systematically reflect upon, discuss, and question their own classroom practice as a basis for improving their teaching. The American curriculum theorist, Joseph Schwab (1969), advocates that the curriculum field should rely less on theory and more on practical methods and principles applicable in concrete situations,

and emphasizes the need to incorporate the learning milieu (or environment) as one of the "commonplaces" that should be taken into account in deliberations about classroom practice. Literature devoted to educational program evaluation provides useful guidance about ways in which teachers can play a more prominent role in curriculum evaluation and in the self-evaluation of their own work (Davis, 1980; McCormick and James, 1982). Extensive work in England involving teachers in the self-evaluation has led Simons (1981) to conclude that, first, when teachers initially became involved in self-evaluation, they preferred the use of questionnaires to other methods (e.g., observation or interview) for obtaining information about their teaching and, second, teachers required support (e.g., on-site consultancy) to sustain self-evaluation. These observations suggest that two positive features of the proposed approach to improving classrooms are that it involved the use of questionnaires as a source of feedback information and that the researchers provided teachers with some on-site consultancy during the project. Furthermore, the fact that this method for improving classrooms utilizes feedback information based on student perceptions means that use is made of an important but often neglected source of information about classrooms (see Weinstein, 1981).

The literature describing classroom interaction analysis and microteaching also provides ideas about the use of feedback to teachers as a means of promoting improved classroom practice (e.g., Olivero, 1970; Dunkin and Biddle, 1974; Peterson and Walberg, 1979). Classroom interaction analysis, which involves the coding of classroom communication (usually verbal) according to category schemes, has been used extensively and successfully in preservice and inservice education as a way of making teachers aware of and subsequently improving their own teaching. Microteaching usually

involves the recording on videotape of a teacher's presentatin of a teaching episode to a small group of students, followed by feedback involving the teacher, supervisor, and peers and, finally, attempts to improve any identified defects in teaching (Brown, 1975). The success of using classroom interaction feedback and microteaching lends some credence to the idea that feedback information based on classroom environment profiles also could provide a useful basis for planning changes in classrooms.

The methods described in this paper have been derived partly from analogous techniques involving the use of Moos's (1974) Social Climate Scales in a range of other human milieus. For example, milieu inhabitants' perceptions of actual and preferred environment have been employed in facilitating change through use of the Ward Atmosphere Scale in psychiatric hospitals (Pierce, Trickett and Moos, 1972), use of both the Ward Atmosphere Scale and the Community-Oriented Program Environment Scale in a psychiatric hospital (Friedman, Jeger and Slotnick, 1982), use of the CES in college and university classrooms (DeYoung, 1977), use of the Community-Oriented Program Environment Scale in an adolescent residential care centre (Moos and Otto, 1972) and in alcoholism treatment programs (Bliss, Moos and Bromet, 1976), use of the Group Environment Scale in staff milieus (Schroeder, 1979), use of the Work Environment Scale in law enforcement agencies (Waters, 1978) and a hospital burn unit (Koran, Moos and Zasslow, 1983), and use of the Family Environment Scale in family therapy groups (Fuhr, Moos and Dishotsky, 1981). Although the above studies are related only peripherally to work in school classrooms, nonetheless, they attest to the general efficacy of the strategy of using environment assessments to guide environmental improvement and suggest some useful ways of conducting and reporting this type of work.

ASSESSING CLASSROOM ENVIRONMENT WITH SHORT FORMS OF SEVERAL CLASSROOM ENVIRONMENT SCALES

This paper incorporates case studies of attempts to use assessments of classroom environments to guide improvements in classrooms which made use of new short forms of three classroom environment instruments, namely, the Classroom Environment Scale (CES), the Individualized Classroom Environment Questionnaire (ICEQ), and the My Class Inventory (MCI). The different subsections below consider (1) brief background information about the original long form of each instrument, (2) development of the short forms, (3) hand scoring of the short forms, and (4) validation of the short forms.

Original Long Forms of CES, ICEQ, and MCI

The initial development of the CES grew out of Moos's program of research in a variety of human environments including hospital wards, therapy groups, military companies, university residences, and work settings (Moos, 1974). The first version of the CES (Trickett and Moos, 1973) consisted of 242 items representing 13 conceptual dimensions, but following trials of the items in 22 classrooms and subsequent item analysis, the number of items was reduced to 208. This item pool was administered in 45 classrooms and modified to form the final published version of the CES (Moos and Trickett, 1974) consisting of 10 items of true-false response format assessing each of nine dimensions (Involvement, Affiliation, Teacher Support, Task Orientation, Competition, Order and Organization, Rule Clarity, Teacher Control, and Innovation). Fisher and Fraser's (1983a) use of the CES among a large sample of science classrooms attested to each scale's internal consistancy reliability, discriminant validity, and ability to differentiate between the perceptions of

students in different classrooms. In addition to an actual (or real) form, the CES also has a preferred (or ideal) form. The preferred form is concerned with goals and value orientations as it measures perceptions of the environment ideally liked or preferred. Although item wording is almost identical for actual and preferred forms, the directions for answering the two forms need to instruct students clearly as to whether they are rating what their class is actually like or what they would prefer it to be like.

The CES has been used as a source of predictor and criterion variables in a variety of studies conducted in the United States and Australia. Use of CES dimensions as predictor variables has established relationships between the nature of the classroom environment and student satisfaction and moods (Trickett and Moos, 1974), student absences and grades (Moos and Moos, 1978), several student reaction indices such as friendship formation and satisfaction (Moos, 1979), students' concepts of themselves and others (Galluzi, Kirby and Zucker, 1980), student mood, achievement, popularity, and adjustment (Wright and Cowen, 1982), and science students' achievement on several inquiry skills and science-related attitudes (Fraser and Fisher, 1982a). In studies which have used the actual version of the CES as a source of criterion variables, Trickett (1978) reported differences between five types of public schools (urban, rural, suburban, vocational, and alternative); Hearn and Moos (1978) found differences between types of classes classified according to Holland's scheme (realistic, investigative, social, conventional, enterprising, and artistic); both Felner, Ginter, and Primavera (1982) and Evans and Lovell (1979) reported differences among classes following alternative educational programs or innovations; Trickett, Trickett, Castro, and Schaffner (1982) found differences between single-sex and coeducational schools; and Harty and Hassan (1983) reported differences between the classes of Sudanese teachers

with different control ideologies. In other studies which have made use both the actual and preferred versions of the CES in the same investigation, both Fisher and Fraser (1983b) and Moos (1979) reported interesting systematic differences between students' and teachers' perceptions of actual and preferred classroom environment. Fraser and Fisher (1983a) found that students achieved better when there was a higher similarity between the actual classroom environment and that preferred by students.

The ICEQ was developed to measure those dimensions which differentiate conventional classrooms from individualized ones involving either open or inquiry-based approaches. The ICEQ's initial development (Rentoul and Fraser, 1979) was guided by several criteria, including consistency with the literature of individualized education and salience to teachers and students. Items were written and subsequently modified after receiving reactions sought from selected experts, teachers, and junior high school students. The resulting preliminary version of the ICEQ containing approximately 15 items per scale was field tested with different samples of students and teachers and data from each sample were subjected to item analyses. The final version of the ICEQ's long form contains 50 items altogether, with an equal number of items belonging to each of the five scales. Each item is reponded to on a five-point scale with the alternatives of Almost Never, Seldom, Sometimes, Often, and Very Often. The scoring direction is reversed for many of the items. The ICEQ is now available in published form which consists of a handbook, a test master set from which unlimited numbers of copies of the questionnaire may be made, and a separate hand-scorable answer sheet (Fraser, 1985c).

The long form of the ICEQ has been used in research applications similar to those described above for the CES. These include the effects of classroom environment on student outcomes (Rentoul and Fraser, 1980; Fraser and Fisher, 1982a, 1983d), differences between student and teacher perceptions of actual and preferred classroom environment (Fraser, 1982b), curriculum evaluation studies (Wierstra, 1984), and person-environment fit investigations of whether students achieve better when in their preferred classroom environment (Fraser and Rentoul, 1980; Fraser and Fisher, 1983b).

The MCI is a simplification of the widely-used Learning Environment Inventory (LEI) (Fraser, Anderson and Walberg, 1982). Whereas the LEI was designed originally for use in research with senior high school students, the MCI is suitable for elementary school children (and for junior high school students who might experience reading difficulties with the LEI). The MCI differs from the LEI in four important ways. First, in order to minimize fatigue among younger children, the MCI contains only five of the LEI's original 15 scales (Cohesiveness, Friction, Difficulty, Satisfaction, and Competitiveness). Second, item wording has been simplified to enhance readability. Third, the LEI's four-point response format has been reduced to a two-point (Yes-No) response format. Fourth, students answer on the questionnaire itself instead of on a separate response sheet to avoid errors in transferring answers from one place to another. The original version of the MCI contained nine items per scale and is included in the first and second versions of the LEI/MCI Manual. Because the reliability of some scales in this version was less than desirable, the third and most recent version of the MCI contains a new 38-item version of the MCI which has improved scale reliabilities (Fisher and Fraser, 1981; Fraser, Anderson and Walberg, 1982).

Past research applications involving the long form of the MCI include studies of the effects of classroom environment on student achievement (Talmage and Walberg, 1978; Fraser and Fisher, 1982b; Ellett, Payne, Masters and Pool, 1977; Fraser and O'Brien, 1985), curriculum evaluation studies (Talmage and Hart, 1977), differences between student and teacher perceptions of actual and preferred environment (Fraser, 1985d), and the effects of grouping students in the laboratory according to formal reasoning ability (Lawrenz and Munch, 1984).

New Short Forms of CES, ICEQ and MCI

Although the long forms of the CES, ICEQ, and MCI have been used successfully by researchers for a variety of purposes in many countries, experience has shown that some workers involved in large-scale research would prefer a more rapid assessment of classroom environment. Similarly, teachers using these instruments for local, school-based evaluation and research purposes often have reported that these instruments, although very useful for their purposes, tend to occupy sizable amounts of time in administration and scoring. Consequently, Fraser and Fisher developed short forms of some instruments and made them accessible to researchers and teachers wanting a more economical way of obtaining an assessment of classroom environment. In order that the new short forms could be used for a wide variety of purposes, both an actual and a preferred version of every scale was developed and validated (Fraser, 1982a; Fraser and Fisher, 1983c).

Three main criteria guided the initial development of the short forms. First, the number of items was reduced to provide greater economy in testing and scoring time. Second, because many teachers using these instruments do

not have ready access to computerized scoring methods, the short forms were designed to be amenable to easy hand scoring. Third, although most existing classroom environment scales were developed to provide adequate reliability for the assessment of the perceptions of individual students, the majority of applications of these assessments involve averaging the perceptions of students within a class to obtain class means. Consequently, it was decided that the short forms should be developed to have adequate reliability for uses involving the assessment of class means, and that it would be recommended that the short forms only be used in applications in which the class mean is the unit of analysis.

The amount of reduction in the length of scales was guided simultaneously by the need to maintain adequate reliability for class means and by advice from teachers and researchers about the amount of testing time which would be preferable. These considerations led to a decision that each instrument would contain approximately 25 items. In the case of the ICEQ, the five 10-item scales in the long form were reduced to five 5-item scales. The 38 items in the long form of the MCI's five scales were shortened to produce an instrument containing five 5-item scales. Because the original form of the CES (90 items) was somewhat longer than the original form of either the ICEQ or the MCI, it was considered desirable to reduce the length of the CES considerably. Consequently, the long form containing nine 10-item scales was reduced to produce a short form consisting of six 4-item scales. This decision was guided largely by the fact that Moos and Trickett's (1974) manual for the CES describes the development of a short 4-item version of each scale.

Table I shows the name of each scale in the short forms and each scale's length and classification according to Moos's scheme for characterizing human

environments. Moos's three basic types of dimensions are: Relationship Dimensions which identify the nature and intensity of personal relationships within the environment and assess the extent to which people are involved in the environment and support and help each other; Personal Development Dimensions which assess the basic directions along which personal growth and self-enhancement tend to occur; and System Maintenance and System Change Dimensions which involve the extent to which the environment is orderly, clear in expectation, maintains control and is responsive to change. Moos (1974) has found that these three categories can be used in conceptualizing the individual dimensions characterizing diverse psychosocial environments.

Insert Table I about here

Development Procedures

The results of item analyses performed with large samples of students responding to the long forms of each instrument provided the main statistical criteria for selection of items for inclusion in the short forms. These item analyses were performed for five separate data sets obtained by administration of the actual form of the CES, the preferred form of the CES, the actual form of the ICEQ, the preferred form of the ICEQ, and the actual form of the MCI. (Although no data were available for a preferred version of the MCI at the time of developing the short forms, a preferred version has been used subsequently and data are reported below.) Internal consistency reliability of the short form of each scale was enhanced by removing items with smaller item-remainder correlations (i.e., correlations between item score and total score on the rest of that scale), and discriminant validity was enhanced by including only those items whose correlation with its own a priori assigned scale was smaller than its correlation with any of the other items in the same

battery. The main logical criteria employed when shortening scales were that a preference was given to items with better face validity and that an attempt was made to maintain a balance (both within individual scales and within each instrument as a whole) of items with positive and negative scoring directions. However, because the long forms of some scales had an imbalance in the number of its items with positive and negative scoring directions, this imbalance tended to be maintained in the short forms.

In the case of both the ICEQ and MCI, the short form consists of five items in each of five scales. In the case of the CES, item analyses were performed initially using the nine 4-item scales comprising the short forms recommended in Moos and Trickett's manual. On the basis of these item analyses, together with the logical considerations outlined above and the prior decision to reduce the length of the test to six scales, a 24-item version of the CES (with four items per scale) was generated. Five of these six scales contained the identical four items to those in Moos and Trickett's version, while the sixth scale (namely, Task Orientation) was made up of two of the items in Moos and Trickett's version together with two different items. In the case of each of the three scales present in the long form of the CES but excluded in the short form, it was found that the 4-item version recommended by Moos and Trickett displayed unsatisfactorily low internal consistency reliability with the present large sample of science classes.

In order to clarify the nature of the short forms of each instrument and to make them readily accessible to science teachers and science education researchers, Appendix A contains a complete copy of the actual form of the ICEQ, CES, and MCI. A separate preferred form of the ICEQ also is provided in this appendix; a preferred version of the CES or MCI could be assembled in a

way analogous to the way that the preferred form of the ICEQ has been put together. Unlike the corresponding long form of each instrument, the short forms do not require a separate response sheet because all items and space for responding fit on a single page. Although item wording is almost identical in actual and preferred forms, words such as "would" are included in the preferred form to help students differentiate between ratings of actual and preferred classroom environment. For example, the statement "Different students do different work" in the actual form of the ICEQ would be changed in the preferred form to "Different students would do different work". Similarly, as Appendix A shows for the ICEQ, the directions for answering the two forms differ somewhat so as to instruct students clearly as to whether they are rating either what their class is actually like or what they would prefer it to be like.

Scoring Procedures

The short forms of each of the instruments have two features which facilitate easy hand scoring. First, underlining of an item number together with inclusion of R in the Teacher Use Only column identifies those items which need to be scored in the reverse direction. Second, items from the five different scales are arranged in cyclic order so that all items from a particular scale are found in the same position in each block of five items. For example, the first item in every block in the ICEQ belongs to the Personalization scale. The copy of the short form of the ICEQ in Appendix A can be used to illustrate the following simple method of hand scoring :

1. Score each item and record the score in the Teacher Use Only column as shown in Appendix A. Items not underlined and without the letter R are scored by allocating the number circled (i.e., by scoring 1, 2, 3, 4, and

5, respectively, for the responses Almost Never, Seldom, Sometimes, Often, and Very Often). Underlined items with the letter R in the Teacher Use Only column are scored in the reverse manner (i.e., by allocating 5, 4, 3, 2, and 1, respectively, for the responses Almost Never, Seldom, Sometimes, Often, and Very Often). Omitted or invalidly answered items (e.g., Items 15 and 20) are given a score of 3.

2. Add the 5 item scores, one from each block of five items, for each scale to obtain the total score for each ICEQ scale. The first item in each block measures Personalization (Pe), the second item measures Participation (Pa), the third item measures Independence (In), the fourth item measures Investigation (Iv), and the last item in each block measures Differentiation (D). For example, the total score for the Personalization scale is obtained by adding the individual scores for Items 1, 6, 11, 16, and 21. Scale totals can be written in the spaces provided at the bottom of the questionnaire. Appendix A illustrates how these hand scoring procedures were used to obtain a total of 16 for the Personalization scale and a total of 12 for the Differentiation scale.

Of course the short form of the ICEQ can be scored by computer. This is done simply by allocating scores of 5, 4, 3, 2, and 1, respectively, for the responses Almost Never, Seldom, Sometimes, Often and Very Often for underlined items; all other items are scored in the reverse manner and omitted or invalidly answered items are given a score of 3. Scale totals are obtained by summing item scores and remembering that the first, second, third, fourth, and fifth item, respectively, in each block of five items measures Personalization, Participation, Independence, Investigation, and Differentiation.

Appendix A also illustrates how the short form of the CES is scored. Items not underlined and without the letter R are scored 3 for True and 1 for False. Underlined items with the letter R are scored in the reverse manner. Omitted or invalid responses are scored 2. To obtain scale totals, the four item scores for each scale are added. The first, second, third, fourth, fifth, and sixth items in each block of six, respectively, measures Involvement, Affiliation, Teacher Support, Task Orientation, Order and Organization, and Rule Clarity. Scale totals can be written in the spaces provided at the bottom of the questionnaire. Appendix A illustrates how these scoring procedures were used to obtain a total of 9 for the Involvement scale and a total of 7 for the Rule Clarity scale.

Appendix A illustrates as well how the short form of the MCI is scored. Items not underlined and without R in the Teacher Use Only column are scored by allocating 3 for Yes and 1 for No. Underlined items with R are scored in the reverse manner. Omitted or invalidly answered items are scored 3. To obtain scale totals, the five item scores for each scale are added. The first, second, third, fourth, and fifth items in each block of five, respectively, measures Satisfaction, Friction, Competitiveness, Difficulty and Cohesiveness. For example, the total Satisfaction scale is obtained by adding scores for Items 1, 6, 11, 16, and 21. Scale totals can be recorded in the spaces provided at the bottom of the questionnaire. (See Appendix A which illustrates how these scoring procedures were used to obtain a total of 10 for Satisfaction and a total of 12 for Cohesiveness.)

Validation

Table 2 provides statistical information about the short form of each scale based on the use of the class mean as the unit of analysis with data

collected from large and representative samples of science classes. The actual and preferred forms of the CES and ICEQ were administered to a sample of 116 Grade 8 and 9 classes in 33 different schools in Tasmania, Australia (Fraser and Fisher, 1983c). Data for the MCI are based on a sample of 758 Grade 3 students in 32 classes in 8 schools in an outer suburb of Sydney, Australia (see Fraser and O'Brien, 1985). As some reading difficulties were anticipated among some students in this sample, a research assistant visited each school to administer the scales orally. As no data on the correlation between long and short form were available for this sample, Table 2 reports the correlation between long and short form for the actual form only for a sample of 100 classes of Grade 7 students in 33 schools in Tasmania, Australia. Each sample was made up of approximately equal numbers of boys and girls.

Insert Table 2 about here

Data reported in Table 2 for the actual and preferred versions of instruments provide evidence in support of each short scale's concurrent validity (namely, the correlation between long and short forms), internal consistency (alpha reliability coefficient), discriminant validity (using the mean magnitude of the correlation of a scale with the other scales in the same instrument as a convenient index), and ability to differentiate between classrooms (ANOVA results) (Fraser and Fisher, 1983c; Fraser and O'Brien, 1985). The first two columns of figures in Table 2 show that the correlations between scale scores on the long form and the short form ranged from 0.78 to 0.97. These values, which do not incorporate a correction for attenuation to compensate for imperfect scale reliability, support the concurrent validity of the short forms. Table 2 also reports each short scale's internal consistency

and discriminant validity (using the class as the unit of analysis). The values of the alpha coefficient ranged from 0.56 to 0.85 with a mean of 0.70 for the short forms. These data indicate that the reliability of a scale's short form is typically less than 0.1 smaller than the reliability of the corresponding long form (as reported in Fraser and Fisher, 1983c) and that the short forms generally have adequate reliability for applications involving class means. Table 2 also shows that the values of the mean correlation of a scale with the other scales in the same instrument are quite similar to those reported previously for the long forms of these scales. These values suggest that the short forms display adequate discriminant validity, and that both the short and long forms of scales in each instrument measure distinct although somewhat overlapping aspects of classroom environment.

A desirable characteristic of the actual form of any classroom environment scale which is to be used in applications involving the class mean as the unit of analysis is that it is capable of differentiating between the perceptions of students in different classes. This was explored for each short scale for the present samples by performing a one-way ANOVA with class membership as the main effect and using the individual as the unit of statistical analysis. The results of these analyses are shown in the last column of Table 2 and indicate that the short form of the actual version of each of the 16 scales differentiated significantly ($p<0.01$) between the perceptions of students in different classrooms. The eta^2 statistic, which is the ratio of between to total sums of squares, is provided as an estimate of the amount of variance in classroom environment scores attributable to class membership.

CASE STUDIES OF CHANGE ATTEMPTS

The previous two major sections were devoted to, respectively, a review of literature related to improving classroom environments and the measurement of classroom environment using some new short forms of classroom environment instruments. In this section, attention focuses on reporting teachers' use of these instruments in systematic attempts to improve their science classes. Whereas the first case study reported below involved use of the short form of the CES in a junior high school classroom, the second case study involved use of the short version of the MCI at the elementary school level.

The first case study involved the use of the actual and preferred short forms of the short version of the CES by a teacher attempting to improve the environment of his classroom. The class consisted of 22 ninth year boys and girls of mixed ability who were studying science with this teacher in a government school in Tasmania. The procedure followed by the teacher incorporated the following five fundamental steps:

1. Assessment. The short version of the CES was administered to all students in the class. The preferred form was answered first, while the actual form was administered in the same time slot one week later.
2. Feedback. The teacher considered feedback information derived by hand scoring student responses to the CES. Data were summarized by means of the profiles shown in Figure 1 representing the class means of students' actual and preferred environment scores. The teacher found these profiles a particularly useful and easily comprehensible way of summarizing the data. In particular, the profiles permitted ready identification of the changes in classroom environment needed to reduce major differences

between the nature of the actual environment and the preferred environment as currently perceived by students.

3. Reflection and discussion. The teacher engaged in private reflection and informal discussion with other teachers about the profiles. This further clarified the interpretation and implications of the profiles and provided the basis for a decision about whether an attempt would be made to change the environment in terms of some of the CES's dimensions. The main criteria used for selection of dimensions for change were, first, that there should exist a sizable actual-preferred difference on that variable and, second, that the teacher should feel concerned about this difference and want to make an effort to reduce it. These considerations led the teacher to decide to introduce an intervention aimed at increasing the levels of Teacher Support and Order and Organization in his class.
4. Intervention. The teacher introduced an intervention of approximately two month's duration in an attempt to change the classroom environment. These interventions consisted of a variety of strategies, some of which originated during discussions between teachers, and others of which were suggested by examining ideas contained in individual CES items. For example, strategies used to enhance Teacher Support involved the teacher moving around the class more to mix with students, providing assistance to students and talking with them more than previously. Strategies used to increase Order and Organization involved taking considerable care with distribution and collection of materials during activities and ensuring that students worked more quietly.
5. Reassessment. The student actual form of the CES was readministered at the end of the intervention to see whether students were perceiving their classroom environments differently from before. Again questionnaires were hand scored and profiles of mean scores were drawn (see Figure 1).

The results are summarized graphically in Figure 1, which includes a dotted line to indicate the class mean score for students' perceptions of actual environment on each of the CES's six scales at the time of posttesting. Figure 1 clearly shows that some change in actual environment occurred during the time of the intervention on five dimensions of the CES. Comparison of the dotted line (posttest actual scores) with the unbroken line (pretest actual scores) indicates that, after the intervention, students perceived much more Teacher Support, Task Orientation, and Order and Organization, and a little more Involvement and Rule Clarity. Moreover, when tests of statistical significance were performed, it was found that pretest-posttest differences were significant only for Teacher Support, Task Orientation and Order and Organization. These findings are noteworthy because two of the dimensions on which appreciable changes were recorded were those on which the teacher had attempted to promote change. (It appears that the intervention, as well as promoting certain desired changes, also led to an unintended side effect in that the class became more task oriented than students would prefer. This important finding highlights the interdependency of different aspects of classroom environment and that change attempts on certain dimensions can be accompanied by unintended changes, either positive or negative, in other aspects of classroom environment).

Insert Figure 1 about here

Although the second administration of the environment scales marked the end of this teacher's attempt at changing a classroom, it might have been thought of as simply the beginning of another cycle. That is, the five steps outlined above could be repeated cyclically one or more times until changes in classroom environment reached the desired levels.

The second case study reported here involved use of the actual and preferred forms of the short version of the MCI by an elementary school teacher wishing to improve the environment of her classroom. This class consisted of 26 Grade 6 students of lower ability attending a coeducational government school in a suburb of Sydney. The procedure followed by the teacher of this class incorporated the following five fundamental steps which are analogous to those outlined above:

1. Assessment. The MCI was administered to all students in the class. The preferred form was answered first, while the actual form was administered a couple of days later. Students in this sixth grade sample found the MCI easy to read.
2. Feedback. The teacher was provided with feedback information derived from student responses (in the form of profiles analogous to those illustrated previously in Figure 1).
3. Reflection and discussion. After reflection and discussion the teacher decided to introduce an intervention aimed at reducing the level of Competitiveness and increasing the level of Cohesiveness.
4. Intervention. The teacher introduced an intervention of approximately two months' duration in an attempt to change the classroom environment. This consisted of a variety of strategies, some of which originated during a number of meetings between the teacher and the researchers, and others of which were suggested by examining ideas contained in individual MCI items. The strategies used to reduce Competitiveness and enhance classroom Cohesiveness consisted of the teacher trying to be more sympathetic and helpful to students, talking privately to students with problems, and avoiding criticizing students in front of the class. As well, the teacher tried to influence the class as a whole to adopt a more

positive attitude toward students experiencing difficulties. Some ideas for the intervention were suggested by considering the wording of the items contained in the Competitiveness and Cohesiveness scales. For example, the item "Some pupils feel bad when they don't do as well as the others" suggested to the teacher that she should be more sympathetic and helpful toward students having difficulties and encourage other students in the class also to help slower students. Items such as "Some people in my class are not my friends" alerted the teacher to the desirability of identifying and giving some special assistance to particular students who seemed to be less well liked by their classmates.

5. Reassessment. The student actual form of the scales was readministered at the end of the intervention.

The results are summarized graphically in Figure 2. Of course a figure involving MCI profiles of actual and preferred scores could be used again as with the CES (see Figure 1). But, instead, Figure 2 has been drawn to illustrate an alternative way of depicting results which some teachers might find useful. In fact, Figure 2 compares profiles of student actual-preferred discrepancy scores obtained before and after the intervention. These discrepancy scores were obtained simply by subtracting the class mean score for students' perceptions of actual environment from the mean score for preferred environment on each of the MCI's five scales. The unbroken line in Figure 2 is the pretest discrepancy profile which corresponds to the separate pretest actual and preferred profiles. The distances between points on the discrepancy profiles and the horizontal line in Figure 2 represent the necessary increase or decrease in each area needed for the class to become as students would prefer it.

Insert Figure 2 about here

Figure 2 clearly illustrates that, during the time of the intervention, an appreciable reduction in actual-preferred discrepancy occurred for the dimensions of Competitiveness and Cohesiveness (i.e., the two dimensions on which change was being attempted), but that a smaller change occurred for the other scales. To further illustrate these findings, a t test for dependent samples for the significance of pretest-posttest changes in discrepancy scores was conducted for each scale. (Since only a single assessment of preferred environment was made, these t tests for pretest-posttest changes in discrepancy scores are equivalent to t tests for pretest-posttest changes in actual scores.) It was found that statistically significant reductions occurred in actual-preferred discrepancy on the Competitiveness scale ($t=2.4$, $p<0.05$) and Cohesiveness scale ($t=2.6$, $p<0.05$) but that nonsignificant changes occurred on the other three MCI scales.

CONCLUSION

The main purpose of this paper has been to familiarize science teachers with some techniques and ideas from the field of classroom environment research which are likely to be practically useful for teachers wishing to assess and improve their classroom environments. In particular, three widely applicable but highly economical classroom environment instruments have been made accessible to teachers (including hand scoring procedures and a copy of each instrument) and comprehensive validation data have been reported to enhance confidence in using these scales. As well, a description has been given of an approach to improving classrooms which is based on information

about student perceptions of their actual and preferred environment, and this was illustrated by reporting two case studies of successful applications of these techniques in science classrooms. The promising findings were that, first, the assessment method was found to be reliable and very convenient and, second, that appreciable changes in environment were perceived for those dimensions on which improvement had been attempted by the teacher. The present work, therefore, suggests the potential usefulness of teachers employing classroom environment instruments to provide meaningful information about their classrooms and a tangible basis to guide improvements in classroom environments.

Although the initial case studies reported in this paper hold considerable promise, their limitations must be acknowledged in two important ways. First, as they involved only two teachers and their two classrooms, more work along these lines is urgenly needed to verify the efficacy of these methods of environmental improvement in other geographic areas, for other school subjects, and at other grade levels. Second, because our primary concern was exploring the effectiveness of a newly proposed application of actual and preferred classroom environment scales, we paid limited attention to the nature of the interventions which were instrumental in bringing out the observed environmental changes. Consequently, although this chapter provides some evidence to justify teachers' confidence in using this approach to changing classrooms, the important task of accumulating detailed information about the nature of the interventions most likely to produce marked changes on particular dimensions of classroom environment has hardly begun. There is considerable scope and need in the future, then, to extend Johnson et al.'s (1984) admirable work in designing strategies for enhancing classrooms cooperation to the design and evaluation of general strategies for changing a

classroom's emphasis on a range of other important classroom environment dimensions.

Traditionally the participants in science education research can be divided into the researchers and the "researched" (i.e., teachers). But recently numerous educators have advocated collaborative action research in which there is a genuine partnership between researchers and teachers and a clear integration of research and practice (see Kennedy, 1977; Florio and Walsh, 1978; Kyle and McCutcheon, 1984; Pine, 1984). According to Pine (1980), some of the desirable outcomes of collaborative action research are that it contributes to the solution of practicitioners' problems and it provides practitioners with professional development experiences which enhance their ability to research and solve their own problems in the future without the assistance of the researcher. There is little doubt that, based on experiences gained in working with the teachers who attempted to change their classrooms in the case studies reported in this chapter, there was a meaningful partnership between teacher and researcher, that progress was made toward solving a perceived classroom problem, and that teachers believed that the experience had contributed to their professional development. Consequently, the case studies described in this chapter, because of the way they involved the teacher and the researcher working together, suggest that the proposed methods for improving classroom environments could provide one workable example of collaborative action research.

Whereas the case studies reported in this chapter involved experienced teachers attempting to change their classrooms, Lacy, Tobin, and Treagust (1984) involved preservice teachers in using a classroom environment instrument to provide feedback about their classrooms. The study involved 40

preservice teachers involved in three microteaching sessions, each one week apart, with small groups of students which made up a total sample of 180 students from one school. Student perceptions of preferred environment were assessed at the beginning of each microteaching session and perceptions of actual environment were assessed at the end of each session. It was found that students' perceptions of actual classroom environment became more positive over time, thus tentatively suggesting that feedback information about students' perceptions of actual and preferred environment helped preservice teachers to change their teaching in ways which students perceived to be improvements. This preliminary study suggests the potential value of introducing preservice teachers to classroom environment instruments in order to sensitize them to important aspects of classroom life and to provide them with a tangible means of obtaining feedback about and guiding improvements in their teaching.

Many educators would agree that changes in classroom environment which make classrooms correspond more closely with students' preferences are worthwhile ends in their own right. But others would ask the obvious question concerning whether the changes in classroom environment observed in the case studies also are accompanied by any gains or losses in terms of student achievement of cognitive or attitudinal outcomes. Certainly person-environment fit research (Fraser and Fisher, 1983a, b) suggests that teachers can expect students to achieve better when there is a greater similarity between the actual environment and that preferred by students. Moreover, in one small-scale study at the college level, DeYoung (1977) found that a reduction in the discrepancy between actual and preferred classroom environment also was accompanied by improved student satisfaction and class attendance. Nevertheless, in view of the limited amount of evidence

available, it is highly desirable that the design of future studies aimed at improving science classrooms should incorporate relevant student outcome measures in order to investigate whether attempts at matching actual and preferred classroom environment are likely to enhance student achievement and attitudes.

REFERENCES

BLISS, F., MOOS, R. and BROMET, E. (1976) Monitoring change in community-oriented treatment programs. Journal of Community Psychology, 4, 315-326.

BROWN, G.A. (1975) Microteaching: A programme of teaching skills. London: Methuen.

CHAVEZ, R.C. (1984) The use of high inference measures to study classroom climates: A review. Review of Educational Research, 54, 237-261.

DAVIS, E. (1980) Teachers as curriculum evaluators. Sydney : Allen and Unwin.

DeYOUNG, A.J. (1977) Classroom climate and class success: A case study at the university level. Journal of Educational Research, 70, 252-257.

DUNKIN, M.J. and BIDDLE, B. (1974) The study of teaching. New York: Holt, Rinehart and Winston.

ELLETT, C.D., PAYNE, D.A., MASTERS, J.A. and POOL, J.E. (1977) The relationship between teacher and student perceptions of school environment dimensions and school outcome variables. Paper presented at Annual Meeting of Southeastern Psychological Association, Miami.

ELLIOTT, J. (1976-77) Developing hypotheses about classrooms from teachers' practical constructs: An account of the work of the Ford Teaching Project. Interchange, 7, 1, 2-22.

EVANS, G.W. and LOVELL, B. (1979) Design modification in an open-plan school. Journal of Educational Psychology, 71, 41-49.

FELNER, R.D., GINTER, M. and PRIMAVERA, J. (1982) Primary prevention during school transitions: Social support and environmental structure. American Journal of Community Psychology, 10, 277-290.

FISHER, D.L. and FRASER, B.J. (1981) Validity and use of My Class Inventory. Science Education, 65, 145-156.

FISHER, D.L. and FRASER, B.J. (1983) Validity and Use of Classroom Environment Scale. Educational Evaluation and Policy Analysis, 5, 261-271. (a)

FISHER, D.L. and FRASER, B.J. (1983) A comparison of actual and preferred classroom environments as perceived by science teachers and students. Journal of Research in Science Teaching, 20, 55-61. (b)

FLORIO, S. and WALSH, M. (1978) The teacher a colleague in classroom research. Occasional Paper 4, Institute for Research on Teaching, Michigan State University.

FRASER, B.J. (1981) Learning environment in curriculum evaluation: A review. "Evaluation in Education" series, Oxford: Pergamon. (a)

FRASER, B.J. (1981) Australian research on classroom environment: State of the art. Australian Journal of Education, 25, 238-268. (b)

FRASER, B.J. (1981) Using environmental assessments to make better classrooms. Journal of Curriculum Studies, 13, 131-144. (c)

FRASER, B.J. (1982) Development of short forms of several classroom environment scales. Journal of Educational Measurement, 19, 221-227. (a)

FRASER, B.J. (1982) Differences between student and teacher perceptions of actual and preferred classroom learning environment. Educational Evaluation and Policy Analysis, 4, 511-519. (b)

FRASER, B.J. (1985) Classroom environment. London: Croom Helm. (in press) (a)

FRASER, B.J. (1985) Improving science teacher education programs through inclusion of research on classroom psychosocial environment. Paper presented at Annual Meeting of American Educational Research Association, Chicago, April 1985. (b)

FRASER, B.J. (1985) Individualized Classroom Environment Questionnaire. Melbourne: Australian Council for Educational Research. (c)

FRASER, B.J. (1985) Differences between preferred and actual classroom environment as perceived by primary students and teachers. British Journal of Educational Psychology. (in press) (d)

FRASER, B.J., ANDERSON, G.J. and WALBERG, H.J. (1982) Assessment of learning environments: Manual for Learning Environment Inventory (LEI) and My Class Inventory (MCI). Perth: Western Australian Institute of Technology.

FRASER, B.J. and FISHER, D.L. (1982) Predicting students' outcomes from their perceptions of classroom psychosocial environment. American Educational Research Journal, 19, 498-518. (a)

FRASER, B.J. and FISHER, D.L. (1982) Predictive validity of My Class Inventory. Studies in Educational Evaluation, 8, 129-140. (b)

FRASER, B.J. and FISHER D.L. (1983) Use of actual and preferred classroom environment scales in person-environment fit research. Journal of Educational Psychology, 75, 303-313. (a)

FRASER, B.J. and FISHER, D.L. (1983) Student achievement as a function of person-environment fit: A regression surface analysis. British Journal of Educational Psychology, 53, 89-99. (b)

FRASER, B.J. and FISHER, D.L. (1983) Development and validation of short forms of some instruments measuring student perceptions of actual and preferred classroom learning environment. Science Education, 67, 115-131. (c)

FRASER, B.J. and FISHER, D.L. (1983). Effects of classroom openness on science students' achievement and attitudes. Research in Science and Technological Education, 1, 41-51. (d)

FRASER, B.J. and O'BRIEN, P. (1985) Student and teacher perceptions of the environment of elementary-school classrooms. Elementary School Journal. (in press)

FRASER, B.J. and RENTOUL, A.J. (1980) Person-environment fit in open classrooms. Journal of Educational Research, 73, 159-167.

FRASER, B.J. and WALBERG, H.J. (1981) Psychosocial learning environment in science classrooms: A review of research. Studies in Science Education, 8, 67-92.

FRIEDMAN, S., JEGER, A.M. and SLOTNICK, R.S. (1982) Social ecological assessment of mental health treatment environments: Toward self-evaluation, Psychological Reports, 50, 631-638.

FUHR, R.A., MOOS, R.H. and DISHOTSKY, N. (1981) The use of family assessment and feedback in ongoing family therapy. American Journal of Family Therapy, 9, 24-36.

GALLUZI, E.G., KIRBY, E.A. and ZUCKER, K.B. (1980) Students' and teachers' perceptions of classroom environment and self- and others-concepts. Psychological Reports, 46, 747-753.

HARTY, H. and HASSAN, H.A. (1983) Student control ideology and the science classroom environment in urban secondary schools of Sudan. Journal of Research in Science Teaching, 20, 851-859.

HEARN, J.C. and MOOS, R.H. (1978) Subject matter and classroom climate: A test of Holland's environmental propositions. American Educational Research Journal, 15, 111-124.

JOHNSON, D.W., JOHNSON, R.T., JOHNSON HOLUBEC, E. and ROY, P. (1984) Circles of learning: Cooperation in the classroom. Alexandria, Virginia: Association for Supervision and Curriculum Development.

KENNEDY, C. (1977) Teachers as researchers: Toward a proper division of labor, occasional Paper 2, Institute for Research on Teaching, Michigan State University.

KORAN, L., MOOS, R.H. and ZASSLOW, M. (1983) Changing hospital work environments: An example of a burn unit. General Hospital Psychiatry, 5, 7-13.

KYLE, D.W. and McCUTCHEON, G. (1984) Collaborative research: Development and issues. Journal of Curriculum Studies, 16, 173-179.

LACY, T.W., TOBIN, K.G. and TREAGUST, D.F. (1984) Development, validation and reliability of the Elementary Science Learning Environment Questionnaire. Paper presented at Annual Conference of International Association for Educational Assessment, Perth, June 1984.

LAWRENZ, F.P. and MUNCH, T.W. (1984) The effect of grouping of laboratory students on selected educational outcomes. Journal of Research in Science Teaching, 21, 699-708.

McCORMICK, R. and JAMES, M. (1983) Curriculum Evaluation in Schools. London: Croom Helm.

MOOS, R.H. (1974) The Social Climate Scales: An overview. Palo Alto, Calif: Consulting Psychologists Press.

MOOS, R.H. (1979) Evaluating educational environments: Procedures, measures, findings and policy implications. San Francisco: Jossey-Bass.

MOOS, R.H. and MOOS, B.S. (1978) Classroom climate and student absences and grades. Journal of Educational Psychology, 70, 263-269.

MOOS, R.H. and OTTO, J. (1972) The Community-Oriented Programs Environment Scale: A method for the facilitation and evaluation of social change. Community Mental Health Journal, 8, 28-37.

MOOS, R.H. and TRICKETT, E.J. (1974) Classroom Environment Scale manual. Palo Alto, Calif.: Consulting Psychologists Press.

OLIVERO, J.L. (1970) Microteaching: Medium for improving instruction. Ohio: Merrill.

PETERSON, P.L. and WALBERG, H.J. (Eds.) (1979) Research on teaching: Concepts, findings, and implications. Berkeley, Calif.: McCutcheon.

PIERCE, W.D., TRICKETT, E.J. and MOOS, R.H. (1972) Changing ward atmosphere through discussion of the perceived ward environment. Archives of General Psychiatry, 26, 35-41.

PINE, G.J. (1980) Collaborative action research: The integration of research and service. In L.A. Morris et al. (Eds.), Research, adaptation, and change. Norman, Oklahoma: Teacher Corps. Research Cluster, U.S. Department of Education.

PINE, G.J. (1984) School context variables and collaborative action research. Paper presented at Annual Meeting of American Educational Research Association, New Orleans, April 1984.

RENTOUL, A.J. and FRASER, B.J. (1979) Conceptualization of enquiry-based or open classroom learning environments. Journal of Curriculum Studies, 11, 233-245.

RENTOUL, A.J. and FRASER, B.J. (1980) Predicting learning from classroom individualization and actual-preferred congruence. Studies in Educational Evaluation, 6, 265-277.

SCHROEDER, C. (1979) Designing ideal staff environments through milieu management. Journal of College Student Personnel, 20, 129-135.

SCHWAB, J.J. (1969) The practical : A language for curriculum. School Review, 78, 1-23.

SIMONS, H. (1981) Process evaluation in schools. In C. Lacey and D. Lawton (Eds.), Accountability and evaluation. London: Methuen.

STENHOUSE, L. (1979) An introduction to curriculum research and development. London: Heinemann.

TALMAGE, H. and HART, A. (1977) A study of investigative teaching of mathematics and effects on the classroom learning environment. Journal of Research in Mathematics Education, 8, 345-358.

TALMAGE, H. and WALBERG, H.J. (1978) Naturalistic decision-oriented evaluation of a district reading program. Journal of Reading Behavior, 10, 185-195.

TRICKETT, E.J. (1978) Toward a social-ecological conception of adolescent socialization: Normative data on contrasting types of public school classrooms. Child Development, 49, 408-414.

TRICKETT, E.J. and MOOS, R.H. (1973) Social environment of junior high and high school classrooms. Journal of Educational Psychology, 65, 93-102.

TRICKETT, E.J. and MOOS, R.H. (1974) Personal correlates of contrasting environments: Student satisfactions in high school classrooms. American Journal of Community Psychology, 2, 1-12.

TRICKETT, E.J., TRICKETT, P.K., CASTRO, J.J. and SCHAFFNER, P. (1982) The independent school experience: Aspects of normative environments of single sex and coed secondary schools. Journal of Educational Psychology, 74, 374-381.

WALBERG, H.J. (1976) The psychology of learning environments: Behavioral, structural, or perceptual? Review of Research in Education, 4, 142-178.

WALBERG, H.J. (1979) (Ed.) Educational Environments and effects: Evaluation, policy, and productivity. Berkeley, Calif.: McCutchan.

WATERS, J. (1978) Evaluating organizational environments in law enforcement agencies: A social climate perspective. Criminal Justice Review, 3, 1-6.

WEINSTEIN, R. (1981) Student perspectives on "achievement" in varied classroom environments. Paper presented at Annual Meeting of American Educational Research Association, Los Angeles, April 1981.

WIERSTRA, R. (1984) A study of classroom environment and on cognitive and affective outcomes of the PLON-curriculum. Studies in Educational Evaluation, 10, 273-282.

WRIGHT, S. and COWEN, E.L. (1982) Student perception of school environment and its relationship to mood, achievement, popularity and adjustment. American Journal of Community Psychology, 10, 687-703.

TABLE 1

Overview of Scales Contained in Short Form of CES, ICEQ, and MCI

Instrument	Level	Items Per Scale	Scale Names		
			Relationship dimension	Personal development dimension	System maintenance & system change dimension
Classroom Environment Scale (CES)	Secondary	4	Involvement Affiliation Teacher Support	Task Orientation	Order & Organization Rule Clarity
Individualized Classroom Environment Questionnaire (ICEQ)	Secondary	5	Personalization Participation	Independence Investigation	Differentiation
My Class Inventory (MCI)	Elementary	5	Cohesiveness Friction Satisfaction	Difficulty Competitiveness	

TABLE 2

Concurrent Validity (Correlation with Long Form), Internal Consistency (Alpha Coefficient), Discriminant Validity (Mean Correlation with Other Scales) and ANOVA Results for Class Membership Differences for Short Forms of CES, ICEQ, and MCI

Scale	Correl. with Long Form		Alpha Reli-ability		Mean Correl. with other Scales		ANOVA Results Eta^2
	Act.	Pref.	Act.	Pref.	Act.	Pref.	Actual
Classroom Environment Scale (CES) (Secondary school level)							
Involvement	0.92	0.93	0.65	0.71	0.43	0.41	0.27*
Affiliation	0.78	0.79	0.64	0.60	0.29	0.31	0.20*
Teacher Support	0.92	0.87	0.78	0.65	0.41	0.35	0.31*
Task Orientation	0.80	0.78	0.59	0.56	0.36	0.37	0.25*
Order & Organization	0.95	0.94	0.74	0.74	0.40	0.43	0.39*
Rule Clarity	0.90	0.84	0.66	0.63	0.38	0.43	0.19*
	(Sample: 116 Grade 8 and 9 classes)						
Individualized Classroom Environment Questionnaire (ICEQ) Secondary school level)							
Personalization	0.95	0.94	0.83	0.73	0.30	0.35	0.29*
Participation	0.92	0.91	0.73	0.70	0.29	0.36	0.21*
Independence	0.84	0.84	0.70	0.75	0.15	0.20	0.28*
Investigation	0.91	0.93	0.69	0.63	0.34	0.36	0.22*
Differentiation	0.97	0.97	0.85	0.84	0.23	0.13	0.39*
	(Sample: 116 Grade 8 and 9 classes)						
My Class Inventory (MCI) (Primary school level)							
Cohesiveness	0.97	-	0.81	0.78	0.25	0.30	0.28*
Friction	0.91	-	0.78	0.82	0.27	0.34	0.33*
Difficulty	0.91	-	0.58	0.60	0.31	0.31	0.15*
Satisfaction	0.94	-	0.68	0.75	0.30	0.38	0.23*
Competitiveness	0.95	-	0.70	0.77	0.11	0.32	0.15*
	(Sample: 32 Grade 3 classes, except for first column which is based on 100 Grade 7 classes)						

* $p<0.01$

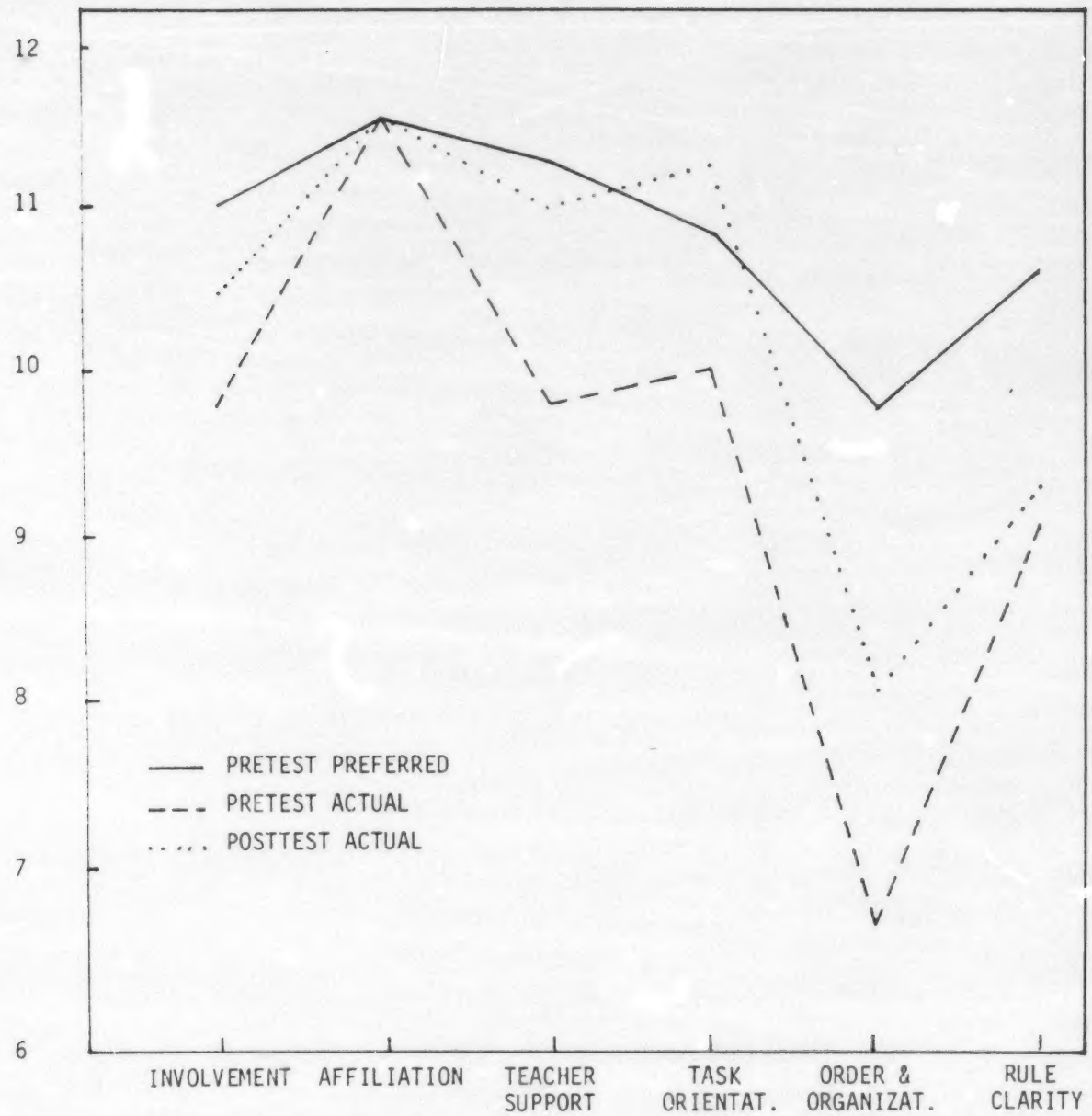

FIGURE 1

PROFILES OF MEAN CLASSROOM ENVIRONMENT SCORES

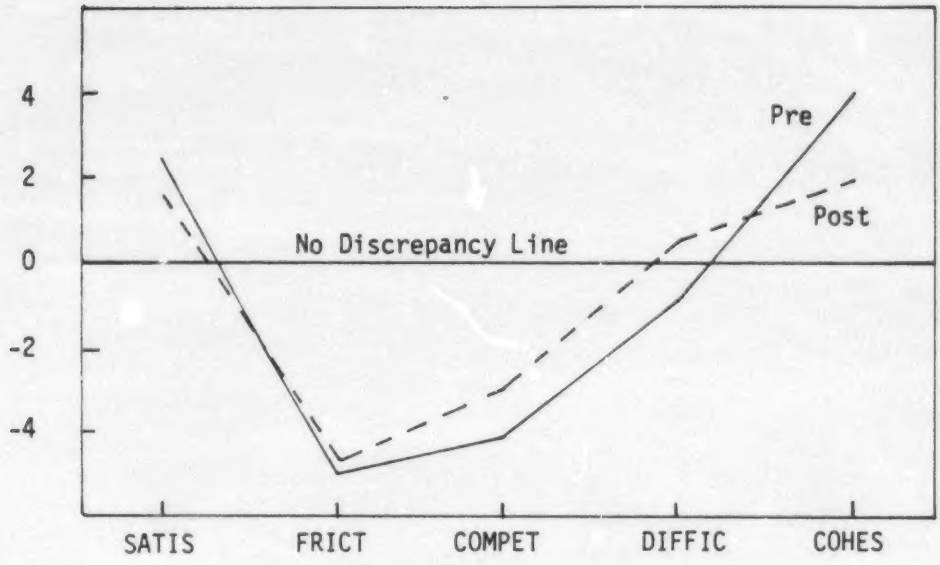

FIGURE 2

Pretest and Posttest Profiles of Actual-Preferred Discrepancy Scores

APPENDIX

INDIVIDUALIZED CLASSROOM ENVIRONMENT QUESTIONNAIRE

ACTUAL SHORT FORM

DIRECTIONS

This questionnaire contains statements about practices which could take place in this classroom. You will be asked how often each practice actually takes place.

There are no 'right' or 'wrong' answers. Your opinion is what is wanted.

Think about how well each statement describes what your actual classroom is like. Draw a circle around

1	if the practice actually takes place	ALMOST NEVER
2	if the practice actually takes place	SELDOM
3	if the practice actually takes place	SOMETIMES
4	if the practice actually takes place	OFTEN
5	if the practice actually takes place	VERY OFTEN

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

NAME _____ SCHOOL _____ CLASS _____

Remember you are rating actual classroom practices	Almost Never	Seldom	Some-times	Often	Very Often	Teacher Use Only
1. The teacher talks with each student.	1	(2)	3	4	5	2
2. Students give their opinions during discussions.	1	2	3	4	5	
3. The teacher decides where students sit.	1	2	3	4	5	R
4. Students find out the answers to questions from textbooks rather than from investigations.	1	2	3	4	5	R
5. Different students do different work.	(1)	2	3	4	5	1
6. The teacher takes a personal interest in each student.	1	2	3	4	(5)	5
7. The teacher lectures without students asking or answering questions.	1	2	3	4	5	R
8. Students choose their partners for group work.	1	2	3	4	5	
9. Students carry out investigations to test ideas.	1	2	3	4	5	
10. All students in the class do the same work at the same time.	1	(2)	3	4	5	R 4
11. The teacher is unfriendly to students.	1	(2)	3	4	5	R 4
12. Students' ideas and suggestions are used during classroom discussion.	1	2	3	4	5	
13. Students are told how to behave in the classroom.	1	2	3	4	5	R
14. Students carry out investigations to answer questions coming from class discussions.	1	2	3	4	5	
15. Different students use different books, equipment and materials.	1	2	3	4	5	3
16. The teacher helps each student who is having trouble with the work.	1	2	(3)	4	5	3
17. Students ask the teacher questions.	1	2	3	4	5	
18. The teacher decides which students should work together.	1	2	3	4	5	R
19. Students explain the meanings of statements, diagrams and graphs.	1	2	3	4	5	
20. Students who work faster than others move on to the next topic.	1	(2)	3	4	(5)	3
21. The teacher considers students' feelings.	1	(2)	3	4	5	2
22. There is classroom discussion.	1	2	3	4	5	
23. The teacher decides how much movement and talk there should be in the classroom.	1	2	3	4	5	R
24. Students carry out investigations to answer questions which puzzle them.	1	2	3	4	5	
25. The same teaching aid (e.g., blackboard or overhead projector) is used for all students in the class.	1	2	3	4	(5)	R 1
	Almost Never	Seldom	Some-times	Often	Very Often	

4 Pe 16 Pa____ Id____ Iv____ D 12

INDIVIDUALIZED CLASSROOM ENVIRONMENT QUESTIONNAIRE

PREFERRED SHORT FORM

DIRECTIONS

This questionnaire contains statements about practices which could take place in this classroom. You will be asked how often you would like or prefer each practice to take place.

There are no 'right' or 'wrong' answers. Your opinion is what is wanted.

Think about how well each statement describes what your preferred classroom is like. Draw a circle around

1	if you'd prefer the practice to take place	ALMOST NEVER
2	if you'd prefer the practice to take place	SELDOM
3	if you'd prefer the practice to take place	SOMETIMES
4	if you'd prefer the practice to take place	OFTEN
5	if you'd prefer the practice to take place	VERY OFTEN

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

NAME _____ SCHOOL _____ CLASS _____

Remember you are rating preferred classroom practices	Almost Never	Seldom	Some-times	Often	Very Often	Teacher Use Only
1. The teacher would talk with each student.	1	2	3	4	5	____
2. Students would give their opinions during discussions.	1	2	3	4	5	____
3. The teacher would decide where students sit.	1	2	3	4	5	R ____
4. Students would find out the answers to questions from textbooks rather than from investigations.	1	2	3	4	5	R ____
5. Different students would do different work.	1	2	3	4	5	____
6. The teacher would take a personal interest in each student.	1	2	3	4	5	____
7. The teacher would lecture without students asking or answering questions.	1	2	3	4	5	R ____
8. Students would choose their partners for group work.	1	2	3	4	5	____
9. Students would carry out investigations to test ideas.	1	2	3	4	5	____
10. All students in the class would do the same work at the same time.	1	2	3	4	5	R ____
11. The teacher would be unfriendly to students.	1	2	3	4	5	R ____
12. Students' ideas and suggestions would be used during classroom discussion.	1	2	3	4	5	____
13. Students would be told how to behave in the classroom.	1	2	3	4	5	R ____
14. Students would carry out investigations to answer questions coming from class discussions.	1	2	3	4	5	____
15. Different students would use different books, equipment and materials.	1	2	3	4	5	____
16. The teacher would help each student who is having trouble with the work.	1	2	3	4	5	____
17. Students would ask the teacher questions.	1	2	3	4	5	____
18. The teacher would decide which students should work together.	1	2	3	4	5	R ____
19. Students would explain the meanings of statements, diagrams and graphs.	1	2	3	4	5	____
20. Students who work faster than others would move on to the next topic.	1	2	3	4	5	____
21. The teacher would consider students' feelings.	1	2	3	4	5	____
22. There would be classroom discussion.	1	2	3	4	5	____
23. The teacher would decide how much movement and talk there should be in the classroom.	1	2	3	4	5	R ____
24. Students would carry out investigations to answer questions which puzzle them.	1	2	3	4	5	____
25. The same teaching aid (e.g., blackboard or overhead projector) would be used for all students in the class.	1	2	3	4	5	R ____
	Almost Never	Seldom	Some-times	Often	Very Often	

Pe____ Pa____ Id____ Iv____ D____

CLASSROOM ENVIRONMENT SCALE

ACTUAL SHORT FORM

DIRECTIONS

This questionnaire contains statements about practices which could take place in this classroom. You will be asked how well each statement describes what your class is actually like.

There are no 'right' or 'wrong' answers. Your opinion is what is wanted.

Think about how well each statement describes what your actual classroom is like. Draw a circle around

True if it is TRUE or MOSTLY TRUE that the practice actually takes place;

False if it is FALSE or MOSTLY FALSE that the practice actually takes place.

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

AME _____ SCHOOL _____ CLASS _____

Remember you are describing your actual classroom	Circle Your Answer	Teacher Use Only	Remember you are describing your actual classroom	Circle Your Answer	Teacher Use Only
1. Students put a lot of energy into what they do here.	(True) False	3	13. Students are often "clockwatching" in this class.	True (False)	R 3
2. Students in this class get to know each other really well.	True False	___	14. A lot of friendships have been made in this class.	True False	___
3. This teacher spends very little time just talking with students.	True False	R ___	15. The teacher is more like a friend than an authority.	True False	___
4. We often spend more time discussing outside student activities than class-related material.	True False	R ___	16. Students don't do much work in this class.	True False	R ___
5. This is a well-organized class.	True False	___	17. Students fool around a lot in this class.	True False	R ___
6. There is a clear set of rules for students to follow.	True (False)	1	18. The teacher explains what will happen if a student breaks a rule.	True False	2
7. Students daydream a lot in this class.	(True) False	R 1	19. Most students in this class really pay attention to what the teacher is saying.	(True) (False)	2
8. Students in this class aren't very interested in getting to know other students.	True False	R ___	20. It's easy to get a group together for a project.	True False	___
9. The teacher takes a personal interest in students.	True False	___	21. The teacher goes out of his/her way to help students.	True False	___
0. Getting a certain amount of classwork done is very important in this class.	True False	___	22. This class is more a social hour than a place to learn something.	True False	R ___
1. Students are almost always quiet in this class.	True False	___	23. This class is often very noisy.	True False	R ___
2. Rules in this class seem to change a lot.	(True) False	R 1	24. The teacher explains what the rules are.	(True) False	3

I 9 A___ TS___ TO___ OO___ RC 7

MY CLASS INVENTORY

ACTUAL SHORT FORM

DIRECTIONS

This is not a test. The questions inside are to find out what your class is actually like.

Each sentence is meant to describe what your actual classroom is like. Draw a circle around

Yes if you AGREE with the sentence
No if you DON'T AGREE with the sentence

EXAMPLE
27. Most children in our class are good friends.

If you agree that most children in the class actually are good friends, circle the Yes like this:

(Yes) No

If you don't agree that most children in the class actually are good friends, circle the No like this:

Yes (No)

Please answer all questions. If you change your mind about an answer, just cross it out and circle the new answer.

Don't forget to write your name and other details on the top of the next page.

NAME _____ SCHOOL _____ CLASS _____

Remember you are describing your actual classroom	Circle Your Answer	Teacher Use Only
1. The pupils enjoy their schoolwork in my class.	(Yes) No	3
2. Children are always fighting with each other.	Yes No	
3. Children often race to see who can finish first.	Yes No	
4. In our class the work is hard to do.	Yes No	
5. In my class everybody is my friend.	Yes (No)	1
6. Some pupils are not happy in class.	(Yes) No	R 1
7. Some of the children in our class are mean.	Yes No	
8. Most children want their work to be better than their friend's work.	Yes No	
9. Most children can do their schoolwork without help.	Yes No	R
10. Some people in my class are not my friends.	Yes (No)	R 3
11. Children seem to like the class.	Yes (No)	1
12. Many children in our class like to fight.	Yes No	
13. Some pupils feel bad when they don't do as well as the others.	Yes No	
14. Only the smart pupils can do their work.	Yes No	
15. All pupils in my class are close friends.	(Yes) (No)	2
16. Some of the pupils don't like the class.	Yes (No)	R 3
17. Certain pupils always want to have their own way.	Yes No	
18. Some pupils always try to do their work better than the others.	Yes No	
19. Schoolwork is hard to do.	Yes No	
20. All of the pupils in my class like one another.	(Yes) No	3
21. The class is fun.	Yes No	2
22. Children in our class fight a lot.	Yes No	
23. A few children in my class want to be first all of the time.	Yes No	
24. Most of the pupils in my class know how to do their work.	Yes No	R
25. Children in our class like each other as friends	(Yes) No	3

S 10 F ___ Cm ___ D ___ Ch 12